



TOPIC:3- NORMAL FORMS

If we write the given statement in a porticular form (interms of Λ , V and \neg), then it is called Normal form:

is called Normal form:

A product of the statement variables and A product of the statement variables and their negations in a formula is called Elementry products:

For example, let P and Q be any two atomic for example, let P and Q be any two atomic products:

Then possible elementry products are

P, Q, $\neg P$, $\neg Q$, $\neg P \wedge Q$, $\neg Q \wedge P$, $\neg P \wedge Q \wedge Q$

A sum of the two statement variables and their negation is called Elementry sum.

Let P and O be any two atomic variables.

Then P, Q, PVQ, ¬PVQ, PV¬Q, PV¬PVQ

We some examples of elementry sum.





Disjecutive Normal Form (DNF)

A statement formula which is equivalent to a given formula and which consists of a sum of elementry products is called a Disjunction Normal Form of the given formula

Conjunctive Normal Form (CNF)

A statement formula which is equivalent to a given formula and which consists of a product of elementry sum is called a conjunction Normal Form of the given formula.

Principal Normal Forms

Lit P and a be two statement variable then the minterms are PAQ, PATQ, TPAQ, TPATQ

The maxterms a are

PVa, PV-a, -PVa, -PV-a





Principal Normal Forms

Lit P and Q be two statement variable

then the minterms are

PAQ, PATQ, TPAQ, TPATQ

The maxterms a are

PVa, PV-a, -PVa, -PV-a

Prinipal Disjunctive Normal Forms (PDNF)

For a given statement formula, an equivalent formula consisting of disjunction of minterns

is called a Prinipal Disjunctive Normal Forms

Primipal Conjunctive Normal Forms (PCNF)

For a given statement formula, an equivalent formula consisting at conjunction of maxterms formula is known as its Principal conjuction only is form (PCNF).





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PCNF and IPDNF, for
EDD R) A (Q cop)
(¬¬PVR) 1 [(a→P)1 (P→Q)]

⇒ (PVR) ∧ [(¬QVP) ∧ (¬PVQ)]

⇒ (PVRVF) ∧ [(¬QVPVF) ∧ (¬PVQVF)]

    (PVRV (Q∧¬Q)) Λ [(¬QVPV(R∧¬R)) Λ
                   (-PVQV(RA-R))]
1 (-PVQVR) 1 (-PVQV-R)
(PVaVR) A. (PV-QVR) A (PV-QVR) A(PV-QV
            1 (-PVQVR) 1 (-PVQMR)
S (PVQVR) A (PV-QVK) A (PV-QV-RI
      1 (-PVQVR) 1 (-PVQV-R) (PCNF
75: (PVQV-R) 1 (-PV-QVR) 1 (-PV-QV
7(75): (7 PAGAR) V (PAGAR) V (PAGAR)
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S: (¬PA¬QAR) V (PAQAR)

(PDNF)





2. Obtain the principal disjunctive and conjunctive

normal forms (P -> (QAR)) A (TP -> (TQATR))

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5 \iff (P \rightarrow (QAR)) \land (\neg P \rightarrow (\neg QA \neg R))
(¬PV(QAR)) A (¬¬PV(¬QA¬R))
 (¬PVQ) A (¬PVR) A (PV¬Q) A (PV¬R)
(TPVQVF) A (TPVRVF) A (PVTQVF) A (PVTRVF)
(TPVQV(RATR)) A (TPVRV(QATQ))
  A (PV TQV (RATR)) A (PV TRV (QATQ))
( TPVQVR) A (TPVQVTR) A (TPVRVQ) A (TPVRVQ)
 M(PV-QVR) A (PV-QV-R) A (PV-RVQ) A (PV-RV-Q)
S ( TPVQVR) A ( TPVQV TR) A ( TPVQVR) A (TPV TQVR)
  A (PV-QVR) A (PV-QV-R) A (PVQV-R) A (PV-QV-R)
           This is required PCNF
S⇔ (¬PVQVR) A (¬PVQV¬R) A (¬PV¬QVR)A(PV¬QVR)
 1 (PV-aV-R) 1 (PVQV-R) (PCNF)
75 0 (¬PV¬QV¬R) A (PVQVR)
T(75) 		 (PAQAR) V (TPATQATR)
S (PAQAR) V (¬PA¬QA¬R) (PDNF)
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Obtain the PDNF of (PAQ) V(-PAR) V(QAR).

P	a	R	PAQ	¬P	-PAR	QAR	(PAQ) V(¬PAR) V(QAR)	Min term
T	T	Т	Т	F	F	T	Ð	PAQAR
т	T	F	Т	F	F	F	1	PAQATR
T	F	T	F	F	F	F	F	
T	F	F	F	F	F	F	F	
F	T	Т	F	T	T	T	1	- PAQAR
F	T	F	F	Т	F	F	F	
F	F	T	F	T	T	F	0 l	7PA7GAR
F	F	F	F	T	F	F	F	18 19 Oct